Canadian *P. ramorum*

Nursery Certification Program

Certification Standard

This national P. ramorum *Certification Program was developed and produced with contributions from:*

- *BC Landscape & Nursery Association*
- *BC Investment Agriculture Council*
- *BC Ministry of Agriculture & Lands*
- *Agricultural Policy Framework, Food Safety & Quality, Plant & Animal Health Transition Program*

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1.0 Introduction

The following document outlines the standards required for *Phytopthora ramorum* (Sudden Oak Death) Certification in Canada. This document will hereafter be referred to as the Standard. This is a program to control the spread of *P. ramorum* in the Canadian nursery industry and in the Canadian environment.

This program is accredited by the Canadian Nursery Certification Institute (CNCI) with program services provided by designated administrators in Canada.

Notice:
Implementing the actions that are outlined in this Standard will reduce but not eliminate the risk of P. ramorum being established or found on plants at your nursery. This certification system CANNOT GUARANTEE FREEDOM FROM *P. ramorum* disease.

The objective of a *P. ramorum* certification program is to:

- Keep Canada open for trade in nursery products.
- Reduce the likelihood of introduction, establishment and spread of *P. ramorum* into the nursery and throughout nursery industry and associated industries of garden retailers and the landscape trade.
- Reduce the risk of spread of *P. ramorum* from the nursery into the Canadian environment.
- Show due diligence by the nursery production facility proving that best efforts have been made to reduce the risk of *P. ramorum* spread.
- Meet or exceed the requirements of a *P. ramorum* pest free place of production (as per pest free place of production defined under ISPM 10 and CFIA policy D-01-01).

There are three key elements to *P. ramorum* certification:

- Evaluation of the facility by annual *P. ramorum* sampling and testing of host plants as well as visual inspection of non-host plants[1]. Test results must be negative for *P. ramorum* for a nursery to participate in this *P. ramorum* Certification Program.
- Prevention of the disease from entering the facility.
- Verification that operations are compliant with processes as described in a signed Canadian *P. ramorum* Certification Standard by an independent third party audit.

[1] Where non-host plants show symptoms of *P. ramorum*, samples should also be taken for *P. ramorum* testing.

1.1 Applicants

Eligible applicants are nurseries or greenhouse operations located in Canada. To become a *P. ramorum* certified nursery, the facility must:

- Be located in Canada.
- Have completed and signed an Application form (Appendix I).
- Sign a *P. ramorum* 'Information Release Agreement' (Appendix II) to enable CFIA's sampling and testing results to be provided for the Canadian *P. ramorum* Certification Program. This form also enables the CFIA to communicate the release of a facility with a positive from quarantine enabling the facility's certification to be re-instated.
- Have implemented the conditions of the *P. ramorum* Certification Standard, and document and implement all mandatory practices and biosecurity measures as designated in this Standard.
- Have signed a *P. ramorum* Certification Compliance Agreement (Appendix III) that confirms the implementation of this Standard at the certified nursery.

In situations where a firm has distinct separate facilities, the nursery may choose to designate each facility as a separate entity which will require a separate signed Compliance Agreement. A separate facility is one that is under different management and/or is under an autonomous management structure or has a clear geographic separation.

- Upon receipt of the Compliance Agreement and verification of adequate sampling and visual inspection by the Canadian National Certification Institute (CNCI), the applicant will be certified.
- The applicant's facility and records will be evaluated within the first 12 months by trained and authorized auditors of the CNCI.
- Each facility that meets the conditions of this *P. ramorum* Certification Standard will be posted to the Canadian Nursery and Landscape Association website (www.canadanursery.com). The list will include the name and address of the facility.
- If the facility does not have a passing status it will be removed from the list and will no longer be *P. ramorum* certified.
- Continuation of certification status will be contingent on the designated staff attending prescribed training as described in Section 9 of this document and ongoing compliance of all mandatory sections of this document.
- Where the nursery chooses to designate separate facilities they will also receive a unique number and will be designated and audited separately.

2.0 Responsibilities of Management and Key Personnel

Facility management is defined as follows:

Administrative Management:

a) Administrating the record keeping, inventory management, and plant traceability.

b) Ensuring that all documentation is properly kept for internal and external audit.

c) Developing a program for their nursery production facility that meets the standards outlined in the signed *P. ramorum* Certification Compliance Agreement.

d) Overseeing the preventative and corrective actions that are identified by internal or external audits or brought to the attention of the administration manager by other channels.

e) Reviewing and verifying that the system is working once it is up and running.

Ensure that the certified facility has in its employ sufficient competent staff to carry out the requirements of this Certification Standard.

Implementation Management:

a) Ensuring all elements of the plan that pertain to the facility operations are in place and monitored on a regular basis. (This refers to the day-to-day activities.)

b) Initiating preventative and corrective actions (on an ongoing basis).

Internal Self-Audit:

The purpose of the internal self-audit is to verify that processes and biosecurity measures outlined in this document and agreed to via the Compliance Agreement have been correctly implemented.

a) The Administrative Manager shall designate the internal auditor. (This person may be an outside contractor.)

It should be noted that in some operations the Administrative and Implementation Manager may be the same person.

The Administrative Manager of the nursery facility must ensure that all elements of the signed *P. ramorum* Certification Compliance Agreement have been implemented, that internal audits are in place and that needed corrective actions are carried out immediately.

3.0 Evaluation of Nursery

- Nurseries will be eligible for *P. ramorum* Certification when plants have been sampled, tested and found negative for *P. ramorum*.
- In order to maintain a certified status after acceptance into the *P. ramorum* Certification system, a certified nursery must:
    - Be sampled and tested annually for *P. ramorum* by CFIA or the CNCI authorized designates with test results showing no positive findings for *P. ramorum*. Recognizing that CFIA conducts annual surveys for *P. ramorum* as well as other testing, the results of CFIA surveys and testing may be recognized by CNCI in lieu of sampling and testing by CNCI designates. Visual inspections of non-host material is an integral part of the accreditation process and is presently only available through the CNCI or its designate (not the CFIA) unless otherwise approved.
    - Implement Mandatory Best Management Practices as outlined in this Standard and listed in the Compliance Checklist (Appendix X).
    - Participate in an audit annually.
    - Sign a Compliance Agreement.
    - Attend workshops and information sessions when required.

- Sample and test host plants annually, including visual inspection of non-host plants.
- Implement Best Management Practices (BMP's)
- Participate in an independent audit annually.
- Sign Compliance Agreement
- Attend workshops and info sessions.

4.0 Record Keeping and Traceability

Good record keeping enabling efficient traceability is one of the most critical aspects of *P. ramorum* certification. Records shall be kept for a minimum of seven (7) years.

If a nursery is implicated in a *P. ramorum* find, whether by trace-out or by the national survey, good record keeping can:

- Protect your nursery by identifying movement of suspect material.
- Allow the focus of resources on areas where *P. ramorum* infected plants have been within your nursery rather than applying resources to the entire nursery production area.
- Provide proof of due diligence with respect to movement of *P. ramorum* infested material within the nursery.
- Allow identification of high risk areas so that the nursery can apply appropriate sanitation procedures that will reduce the risk of areas of the nursery retaining sources of inoculum and thus re-infesting the nursery.
- Assist in a trace-out investigation, if required.

All *P. ramorum* Compliance Agreements, a copy of this Standard [2] and any associated written procedures and manuals developed by the facility shall be available to nursery staff, internal auditors and external auditors to ensure knowledge and compliance.

An up-to-date map shall be kept that shows the locations of all production areas on the nursery. This map is for reference purposes and must be available to staff and auditors.

- Keep records for seven years
- Must have Compliance Agreement and Nursery Certification Manual ready for inspection
- An up-to-date nursery map showing production areas must be available

[2] The Canadian *P. ramorum* Nursery Certification Standard will be updated based on current knowledge of *P. ramorum* and the resulting changes in requirements. For the current version of the Standard, go to the CNLA website at www.canadanursery.com and click on the 'Nursery Programs' link to access the latest version.

4.1 Verification of Internal Plant Movement and Monitoring

Records of the movement and monitoring of plant material shall be maintained.

The purpose of record keeping is to:

- Demonstrate where plants or parents of plants have originated.
- Where blocks have been placed within the nursery.
- Where plants have been located within the facility.
- To confirm that you have been monitoring for *P. ramorum* symptomatic material.

4.2 Incoming Plants

Records shall be kept such that the audit can ensure that all new plants meet the requirements of this Standard. Records must include the following:

- Record keeping of incoming plants

Plant Information:

- Source of plants (supplier name and nursery location).
- *P. ramorum* Certification status of plants.
- Name and description of plants.
- Date of receiving.
- When plants are from outside of Canada, a copy of the Phytosanitary Certificates must be retained.
- Date of visual inspection, person conducting inspection and inspection results.

Record Keeping Requirement for Host Plants from Non-*P. ramorum* Certified Nurseries:

- Records must be kept of *P. ramorum* host plants placed in isolation blocks for sampling and testing, as per Section 5.2 of this Standard.
- Sampling and testing records of plants held in isolation.

4.3 Plants Received for Immediate Resale

Plants for immediate resale must have originated from facilities that have been Certified under recognized *P. ramorum* certification programs recognized by CNCI or CFIA to be sold as '*P. ramorum* Certified'.

Plants originating from non-certified sources (other than pest-free areas) brought in for immediate

re-sale cannot be sold as *P. ramorum* certified if they have not met the requirements as outlined in Section 5.2 of this document. Uncertified plants must remain segregated in the shipping area and not move into any production area in the nursery. These plants must be clearly identified on shipping and invoicing records as non-certified. Records of purchase and sale must be kept as described in Section 4.2.

Plants will be considered as plants for resale until such time that they have moved from the shipping area into the production facility. Once the plants enter the production facility they must follow criteria outlined in this Standard.

The shipping area is defined as a place where plants are collected for outgoing shipments, or received from incoming shipments, and which is separated from the production facility by a barrier at least .5 meters (50 cm) higher than the highest plant adjacent, or by a 2 meter buffer of no plants.

4.4 Outgoing Plants

- Keep records of outgoing plant shipments

Records shall include:

- Name and description of plants.
- Last growing location on nursery prior to movement.
- Destination of plants.
- Date of shipment.
- Record of final visual inspection, signed or initialled and dated by person carrying out inspections of outgoing plants.
- Copy of Phytosanitary Certificate, where applicable.

4.5 Spray Records

Spray records of all fungicides applied within the nursery must be recorded.

- Records must be kept as per provincial or federal regulatory agency requirements.

4.6 Soilless Media, Organic Mulches and/or Soil

Records shall be kept on all incoming shipments of soilless media, organic ingredients used to make soilless media, organic mulches and soil. Delivery memos or invoices are sufficient.

- Keep records of media and ingredients purchases

4.7 Records of Visitors

It is recommended that records of visitors to the site be kept.

5.0 Preventing the Introduction of *P. ramorum*

Participants in the *P. ramorum* Certification program agree to develop a systems approach to prevent the introduction of *P. ramorum* into their nursery. The critical pathway by which the nursery industry can potentially spread *P. ramorum* is through the movement of infected plants. This standard addresses this critical pathway by requiring that certified nurseries do the following:

The #1 most effective risk management tool nursery growers have is to ensure that their incoming stock is clean and that all debris from the delivery truck is disposed of off-site.

Once on-site, P. ramorum *is extremely difficult - and expensive - to eradicate.*

5.1 Plants from P. ramorum-Certified Nurseries

A *P. ramorum*-Certified nursery shall purchase plants from:

- Sources which participate in a *P. ramorum* Certification program approved by the CNCI, or
- *P. ramorum* free areas accompanied by a phytosanitary certificate, or
- Any domestic regions deemed by CNCI to be of low risk, or
- Nurseries under a *P. ramorum* certification program approved by CFIA

It is recommended for all purchases, that suppliers should provide evidence that BMP's have been put in place at place of production.

If incoming plants originate from approved *P. ramorum*-certified sources or from nurseries in regions where *P. ramorum* is not known to exist:

- Upon visual inspection, being found 'clean', they may be placed into a *P. ramorum*-certified area of the nursery
- If host plants are found with physical symptoms resembling *P. ramorum*, their treatment should be outlined in the Nursery Certification Manual. This could include refusing the shipment, immediate destruction, sampling and testing, isolation, etc.

Propagation of plants in a *P. ramorum* certified nursery must be from *P. ramorum* Certified stock.

All Canadian nurseries certified in the *P. ramorum* Certification Program are listed on www.canadanursery.com.

5.2 Plants from non-P. ramorum Certified Nurseries

5.2.1 Host Plants:

All host plants not purchased from facilities as noted in Section 5.1 are considered to be plants from a non-certified facility. When receiving non-certified plants, plants must be received into isolation prior into entry into the production areas.

The following steps must be taken if plants are intended for entry into the production areas of the facility:

- Incoming host plants must be placed in a designated isolation block until sampling and testing for *P. ramorum* has been completed. This block must be clearly shown on the nursery site map.
- Designated isolation blocks must be kept separated from other plant material by a minimum of 2 meters of buffer zone (canopy to canopy). Buffer zones shall be maintained free of all vegetation, including weeds. An exception to this are sealed poly houses where there is a 2 meter distance from any opening to the nearest plants. If sides of poly houses are rolled up or cut out, the 2 meter buffer 'canopy to canopy' will apply.
- Plants will be sampled by trained (in house) samplers using the sampling protocols recognized by the CNCI. (Appendix V)
- Biosecurity measures must be implemented to limit the possibility of *P. ramorum* dispersal from the isolation block to other production areas of the facility (see Appendix VII).
- Plants will not be sold or moved until negative *P. ramorum* sampling results have been received in writing from a CNCI designated laboratory. Negative ELISA test results will be considered negative for *P. ramorum*. If ELISA tests are positive, then the subsequent PCR tests (or alternate test as determined by the CNCI) must show negative results.
- If samples are positive for *P. ramorum*, the CNCI designated laboratory will immediately notify CFIA.

- Host plants from non-certified nurseries must be segregated, then sampled and tested prior to movement into regular production area
- Further BMP's for host plants from non-certified sources must be followed.

5.2.2 Non-Host Plants:

The plants must be inspected and found free of visual symptoms of *P. ramorum* before placing them into production blocks. When plants have *P. ramorum*-like symptoms, refer to procedures in Section 5.4.

5.3 Plants from Canadian Wildland Sources: (where *P. ramorum* is not known to exist)

As *P. ramorum* is not known to exist in the wild in Canada, plants may be sourced from the natural setting under the following conditions. 'The wild' is considered to be any place where there is a reasonable expectation that the plants have not been introduced, nor have they had been exposed to the risk of pests or diseases from the commercial nursery stream.

- When gathering scion, seed and plant materials from the wild, stock should not be obtained from areas where plants have been introduced by people.
- Said materials may also be gathered with no restrictions from progeny trials, plant banks or seed orchards.
- Plants must be visually inspected for *P. ramorum* symptoms prior to harvest and monitored after culturing.

The *P. ramorum* Certification program is designed to minimize the risk of moving *P. ramorum*. At the present time, all detections are related to the commercial nursery stream. Therefore the purpose of this section is to limit movement of stock which has had access to commercial sources from moving into the wild, to be collected and returned to the nursery stream.

Example: taking stock from wild areas immediately from burms adjacent to your nursery would not be considered 'taking from the wild'.

5.4 Inspection of Incoming Plants

Visual inspections of all incoming plant shipments shall be conducted by trained employees of the certified nursery or third party contractors, who meet the requirements outlined in Section 9.0 (Training requirements). If plants are found to have visual symptoms of *P. ramorum*, the plants should be handled as defined in the facility's *P. ramorum* Nursery Certification Manual (e.g. high risk host plants will be handled in a different manner than non host plants). Refer to Appendix V for further information.

- All incoming plants must be visually inspected.
- Policies for handling symptomatic plants must be established.

5.5 Plant Returns

The following section outlines procedures to be followed for plant returns to the facility.

Non-host plants may be returned to a certified facility and placed immediately into production blocks.

- All Host Plants must either not be returned to the certified facility or they must be placed in an isolation area, and inspected and sampled as defined in Section 5.2.
- It is recommended that high risk host plants not be returned to the nursery.

- Plant returns must be handled according to risk.
- Host plants should be segregated and inspected and sampled if necessary prior to return into production blocks
- It is recommended that high risk host plants not be returned to the nursery.

5.6 Monitoring of Plants

Regular visual inspection for symptoms of *P. ramorum* shall take place by trained staff or third party on all plants within the nursery, including permanent landscape plantings.

Your manual should define the appropriate number and timing of visual inspections required, based on the season and climatic conditions.

- Record regular visual inspections

Inspection records shall be kept and any suspect symptomatic plants shall be handled as defined in the facility's *P. ramorum* Nursery Certification Manual.

5.7 Plants for Immediate Resale

All host plants for immediate re-sale must have originated from a recognized *P. ramorum* Certification Program or a *P. ramorum*-free place of production in order to be included under the *P. ramorum* Certification Program.

- Plants for immediate resale that do not originate from a recognized *P. ramorum* Certification Program or a *P. ramorum*-free place of production cannot be sold as *P. ramorum* certified under this program.
- These plants must be clearly identified on shipping and invoicing records as non-certified.
- Records of purchase and sale must be kept as described in Section 4.1.
- Plants that originate from a non-certified nursery entering the shipping area of a certified nursery which are then immediately re-shipped (and have not entered the production area) cannot be sold as *P. ramorum* certified stock. Non-certified plants must remain segregated in the shipping area until shipped out.
- If uncertified plants brought in for immediate re-sale are not sold, they may enter the facility as

per requirements in Section 5.2.

Plants will be considered as plants for resale until such time that they have moved from the shipping area into the production facility. Once the plants enter the production facility they must follow criteria outlined in this Standard.

5.8 Nursery Production Practices (BMP's)

As the science of *P. ramorum* becomes better known, mandatory and recommended production practices may change. These 'Best Management Practices' (BMP's) are based on the known science at the time of writing.

Mandatory Nursery Production Practices for All Host Plants:

- Training of appropriate staff must take place to provide information regarding the risk of movement of staff, equipment and plants to minimize potential spore movement within the nursery.
- Training modules are available through the CNCI or its regional administrators.

5.8.1 *All Host Plants*

Highly recommended practices for all host plants are:

1. Host plants should be grown in areas with minimal standing water or puddling.
2. Leaf litter and other plant debris should be controlled to reduce inoculum levels. A policy for maintenance/cleaning of nursery beds and shipping areas should be in place.
3. Movement of staff, equipment and plants should be managed to minimize potential spore movement within the nursery.
4. For all Host genera, an Integrated Pest Management Program should be developed to help minimize the risk of spore movement and to minimize spore transfer if an infected plant is unknowingly brought into the nursery. The IPM program should take into account the risk of infection, based on plant source, rainfall, irrigation practices, type of plants, etc., and may include the application of fungicides.
5. If a suspect positive is found by CNCI authorized testing on a facility but cannot be confirmed by CFIA, it is strongly recommended that the nursery should view the block as a potential risk and manage it accordingly. Minimal recommended actions would be to destroy the suspect plant as well as all plant material within a 2 meter radius of the suspect plant.

5.8.2 *High Risk Host Plants*

The following plants are considered High Risk Host for the purposes of the Canadian *P. ramorum* Certification Program:

- **Rhododendron**
- **Camellia**
- **Viburnum**

As these three genera have been related to virtually all confirmed positive findings of *P. ramorum* in Canada, more rigorous production measures should be followed to minimize the risk of moving *P ramorum* onto or around the facility.

These mandatory BMP's for High Risk Host Plants are in addition to the Nursery BMP's in Section 5.8.1.

Mandatory BMP's for High Risk Host Plants

1. High risk hosts must be segregated from other plants by a buffer of at least two meters (canopy to canopy). The buffer zone may include non-host plants.
2. Plants with *P. ramorum*-like symptoms must be tested.
3. An IPM program must be developed, considering the source of plants, irrigation practices and other risk factors. This may include a preventative fungicide program.
4. As leaves and plant debris provide a favourable climate for sporulation, container beds must cleared of plant debris on a regular schedule as defined in their *P. ramorum* Nursery Certification Manual to minimize risk of infection. At a minimum when beds are rotated.

Highly Recommended Production Practices for High Risk Hosts:

1. Best efforts should be made to minimize leaf wetness by employing irrigation methods that will result in a period of free moisture on leaves of less than six hours per day.
2. Production blocks of high-risk plants should have a weed control program in place.
3. High risk host plants should be grown in areas with minimal standing water or puddling.
4. Movement of high risk host plants should be minimized.
5. Segregate high risk plants when moving and maintaining in over-wintering houses.
6. High risk host plant 'culls' should be disposed of off-site, preferably in poly bags in a landfill.

5.9 Biosecurity

Biosecurity guidelines have been developed in order to assist each facility in developing measures specific to their own operations that will further help prevent the introduction of *P. ramorum* into the facility.

- These guidelines can be found in Appendix VII.
- Each nursery participating in this *P. ramorum* Certification Program should develop and document a set of biosecurity measures based on these guidelines.
- Note that these guidelines are subject to revision as new data and scientific information become available.

Mandatory Biosecurity Requirements

1. A Visitor policy must be in place. The policy must have entry restrictions into production areas based on prior activities of visitors, as well as any other issues that would impact the risk of introducing *P. ramorum* infestation into the nursery.
2. A sanitation policy (cleaning and disinfection) must be developed and implemented to minimize the risk of moving spores into and around the nursery. Refer to Appendix IX.
3. All plant debris from external sources must be collected and disposed by bagging and dumping off-site.

Highly Recommended Biosecurity Practices

1. A record of visitors (visitor's log) to the nursery is recommended, which would include queries regarding visits to other nurseries, or other activities which could pose a risk of importing the pathogen.
2. Movement of staff while working should be from low risk plants to high risk plants at the end of the day.
3. Movement of staff, equipment and plants should be managed to minimize spore transmittal around the nursery.

6.0 Audit Requirements

To maintain *P. ramorum* certification the following audit procedures are mandatory.

6.1 Internal Self-Audit

- Internal audit must be performed twice annually.

The Administration Manager shall designate a party to perform internal audits. The *P. ramorum*-certified facility must produce a written report on each audit performed. Internal self-audits shall take place a minimum of two (2) times per year. A checklist to assist in the self-audit is included in Appendix X.

If non-conformances are detected, control measures must be taken to ensure compliance with the *P. ramorum* Certification Standard.

6.2 External Audit

- Nursery Certification Manual must be provided to CNCI
- External audit must be performed by CNCI designated auditors annually.
- As CNCP nurseries are audited by CFIA, they are not required to be audited by CNCI auditors.

For new Program participants:

- The facility's Nursery Certification Manual must be provided for review to the CNCI through its program administrators within 6 months of application for Certification status, prior to the external audit.

  In BC, the *P. ramorum* Certification Program is administered by BC Landscape & Nursery Association. Contact the BCLNA office for options to provide your Nursery Manual (hard copy, or e-mail.)
- An external audit will be completed within twelve (12) months of the approval of the Nursery's *P. ramorum* Nursery Certification Manual. Certification will continue based on external audit verification of compliance with the Certification Standard.

For existing program participants:

- As of July 1, 2006, all facilities presently participating in the program must provide their Nursery Certification Manual to the CNCI for their review by a date specified by the program administrator, the BCLNA in BC, and posted on the CNCI website.
- An audit must take place by a date specified by the program administrator, the BCLNA in BC to comply with program requirements. The audit deadlines will be posted on the CNCI website.
- Nurseries participating in the Canadian Nursery Certification Program (CNCP) are not required to undergo a *P. ramorum* Program Audit. All other *P. ramorum* Certification program requirements must be in place and verifiable.

The audit will include verification that all actions noted in the facility's Nursery Certification Manual are being carried out at the nursery.

The frequency and detail of the audits may be changed by the CNCI. Certified nurseries will be

given 30 days notice of such changes.

All written records relating to *P. ramorum*-certified facilities will be maintained at the offices of the CNCI and will be made available to the external auditors.

7.0 *P. ramorum* Detection

When a positive is detected through CNCI-authorized sampling and testing, CFIA must verify the *P. ramorum* positive tests in their own accredited labs in order to confirm the presence of the pathogen. CFIA has final authority to confirm positive results or verify the pathogen was not found.

If a suspect positive is found by CNCI testing on a facility but cannot be confirmed by CFIA, it is strongly recommended that the nursery should view the block as a potential risk and manage it accordingly. Minimal recommended actions would be to destroy the suspect plant as well as all plant material within a 2 meter radius of the suspect plant.

If *P. ramorum* has been confirmed by the CFIA, then CFIA will take appropriate action as per the Infested Nursery Action Plan

- Facilities with a CFIA-confirmed positive must report it to the CNCI or it's designate within twenty-four (24) hours. Failure to report constitutes a major non-conformance.
- In the province of British Columbia, the BCLNA administers the *P. ramorum* Certification Program for the CNCI and is the organization where the confirmed positive report would be reported. Contact information is:

  Hedy Dyck or Jane Stock
  Phone: 604-574-7772
  Toll Free: 1-800-421-7963
  E-mail: hdyck@bclna.com or jstock@bclna.com
  Fax: 604-574-7773

- Nurseries with a confirmed positive must report it to the CNCI or it's designate within 24 hours (one working day) of its confirmation by CFIA.
- On the province of BC, nursery growers with a confirmed positive must contact the BCLNA to advise them of their nursery status.

- A facility with a CFIA confirmed positive will no longer be certified until such time as CFIA regulatory actions are concluded.

8.0 Non-conformance

A *P. ramorum*-certified nursery unable to maintain the required *P. ramorum* certification conditions or found to have a major non-compliance will be advised in writing of their suspension from the program. Plants must not be moved as *P. ramorum* Certified Plants from a facility until requirements as stipulated in this Standard are met.

Major Non-conformance

The following are considered major non-conformances and will result in suspension from the *P. ramorum* Certification Program:

1. Not reporting a CFIA-confirmed *P. ramorum* positive on the facility to the CNCI or its designate.
2. A positive confirmed by the CFIA on a facility
3. Shipping non-certified plants as '*P. ramorum* Certified'
4. Falsified records
5. Failing to meet the Mandatory Requirements for High Risk Host plants as outlined in the Facility's Nursery Certification Manual
6. Failure to carry out internal audits twice yearly
7. Refusal to participate in the external audit
8. Refusal to sample and test as required
9. Failure to pay fees or for services rendered by the CNCI or its program administrators or designates (on behalf of the CNCI)

Minor Non-Conformance

The following are considered minor non-conformances and will result in required corrections and follow-up within a prescribed period of time:

1. Inconsistent record keeping
2. Actions in facility that are not consistent with the facility's *P. ramorum* Nursery Certification Manual, except as noted in 'Major non-Conformance;' above. Refer to Appendix X – 'Audit Checklist'

Facilities which are suspended from the *P. ramorum* Certification Program cannot ship plants as *P. ramorum*-certified until corrective measures are taken to bring the facility into compliance with the *P. ramorum* Certification Program.

Program compliance must be verified by a CNCI-approved external auditor or the CFIA before the suspension can be lifted.

9.0 Training and Education

In order to qualify for the *P. ramorum* Certification Program, qualified personnel must meet the training requirements as specified below:

The *P. ramorum* Certification Workshop explaining the current Certification Standard will be available as a distance training program (on video or DVD) beginning the Fall of 2006.

Contact your provincial *P. ramorum* program administrator to order your copy; in BC contact the BCLNA.

***P. ramorum* Administrative Manager:**

- Must attend a *P. ramorum* Certification Program workshop approved by the CNCI and pass the *P. ramorum* Certification Exam, *or*
- Participate in CNCI authorized distance training program, and pass an invigilated exam.

***P. ramorum* Implementation Manager:**

- Must attend a *P. ramorum* Certification Program workshop approved by the CNCI and pass an exam on *P. ramorum* certification, *or*
- Participate in a CNCI authorized distance training program, and pass an invigilated exam.

- Workshop training for managers is required as noted
- Sampling and inspection staff should participate in a distance training program
- Training must be recorded

Internal sampling, monitoring & self-audit personnel

- Designated sampling and inspection personnel should attend a *P. ramorum* Certification Program workshop approved by the CNCI and pass an exam on *P. ramorum* certification, or
- Register and participate in a CNCI authorized distance training program, trained by authorized personnel who have completed a *P. ramorum* 'Train the Trainer' program and is using the authorized manuals.
- Records of all off site and on site training must be maintained.

10.0 Appendices

Appendix I: *P. ramorum* Certification Application Form CREAM
Appendix II: Information Release Agreement GREY
Appendix III: *P. ramorum* Certification Compliance YELLOW
Appendix IV: FACT SHEET - Record Keeping & Traceability GOLD
Appendix V: FACT SHEET - *P. ramorum* Survey and Sampling Protocols MAUVE
Appendix VI: FACT SHEET - Production Practices (BMP's) PINK
Appendix VII: FACT SHEET - Biosecurity GREY
Appendix VIII: FACT SHEET Preventative IPM program for *P. ramorum* GREEN
Appendix IX: FACT SHEET - Disinfection & Sanitation YELLOW
Appendix X: *P. ramorum* Compliance Checklist BLUE

Appendix I: P. ramorum Certification Application Form

REGISTRATION FORM

Canadian Nursery Certification Institute

P. ramorum Certification Program

Company Contact: Owner

Address Postal Code

Phone Cell Fax Email

Contact (owner or senior employee) who will accompany sampler around nursery: ☐ Same as above.

If different, please provide name, cell phone, regular phone number:

Industry Association Membership Information

Please indicate the associations in which you have approved membership:

☐ BC Landscape & Nursery Association ☐ United Flower Growers Co-op Association
☐ Flowers Canada ☐ Forest Nursery Association of BC ☐ Western Canadian Turfgrass Assn.
☐ Have new membership application pending with following association: _____
☐ Do not belong to any of the above industry association

Product Information

Check categories relevant for your operation:

- ☐ Combination of deciduous / conifer / broad-leafed evergreen
- ☐ All evergreen (conifer / broad-leafed evergreen)
- ☐ All deciduous
- ☐ Floriculture – potted only (cuts aren't regulated)
- ☐ Mix of SOD host and non-host
- ☐ All non-host

Shipping Information

☐ Export directly to USA
Expected shipping dates for next 6 weeks:

_____
_____
_____

☐ Sell to BC company that ships to the USA
☐ Sell directly to other provinces
☐ Sell to BC company that sells to other provinces
☐ All product remains in British Columbia

Production Information

Number of sites:_____ How close to one another?_____

Please provide details on each site sampler will visit:

Sites: give each a name or number	Site Address	# acres	% host plants	% deciduous	% conif/ evergreen	% green-house

INFORMATION RELEASE AGREEMENT

For purposes of Compliance with

CNCI *P. ramorum* Certification Program

I, _____ of _____

(Company Owner or Manager) Business Name (Legal and Operational)

at _____

Address of Business Town Prov Postal Code

By the signature and date below authorize the Canadian Food Inspection Agency to release all information regarding sampling and testing results to the BC Landscape & Nursery Association (as administrators of the P. ramorum Certification program for the Canadian Nursery Certification Institute in the province of BC). The purpose of the Information Release would be to provide information with regards to sampling and test outcomes and information relating to *P. ramorum* issues on the site.

Following are physical (address) locations of the fields to be included in the *P. ramorum* Certification program and for which I authorize the release of sampling and testing information. This includes fields that are under my management/ownership.

	Location	# of Acres
1.	_____	
2.	_____	
3.	_____	
4.	_____	
5.	_____	

The following fields are managed/owned by my company but will not be included in the *P. ramorum* Certification program until further notice:

	Location	# of Acres
1.	_____	
2.	_____	

3. _____

Note: Please add another sheet if space is inadequate to include all locations.

Signed:_____ Date: _____

Contact Phone: _____ Direct E-mail: _____

Please fax this completed form to BCLNA at 604-574-7773

Appendix III: P. ramorum Certification Compliance Agreement

CANADIAN NURSERY CERTIFICATION INSTITUTE
INSTITUT DE CERTIFICATION DES PÉPINIÈRES DU CANADA

***P. RAMORUM* CERTIFICATION**

COMPLIANCE AGREEMENT

P. RAMORUM AGREEMENT NO. (file number)

THIS AGREEMENT dated this ___ day of ____, 20__

BETWEEN:

Canadian Nursery Certification Institute
Suite 102, 5783 – 176A Street
Surrey, BC V3S 6S6
(the "CNCI")

AND:

Nursery
Address
Town, Prov. Postal Code

WITNESSES THAT WHEREAS:

A. The pathogen *Phytophthora ramorum* (Sudden Oak Death or "SOD") presents an ongoing threat to the nursery industry.

B. Movement of nursery plants is a known pathway for spreading *P. ramorum* to new locations; and

C. The CNCI and the Facility wish to enter into this *P. ramorum* Certification Compliance Agreement in order to demonstrate due diligence and to reduce the risk of spreading *P. ramorum* via the movement of plants in the nursery industry.

NOW THEREFORE in consideration of $10.00 and other good and valuable consideration, the CNCI and the Facility agree as follows:

I. The Facility agrees to fully implement the mandatory components of the *P. ramorum* Certification Standard which is attached to this Agreement as Appendix 1 (the "Standard").

II. The Facility agrees to follow all instructions contained in this Agreement and the Standard at the following production areas:

(Address of nursery site(s)

III. **The Facility acknowledges and agrees that this is a risk reduction program and that fully implementing the Standard is not a guarantee that *Phytophthora ramorum* will not be found at the Facility.**

IV. The Facility hereby releases, agrees to indemnify and to save harmless the CNCI from all liability, if any, arising from the movement and sale of plants from the Facility which have been grown according to the

Standard.

V. The Facility agrees to communicate any notification it receives from the Canadian Food Inspection Agency or its designate (the "CFIA") of a positive *Phytophthora ramorum* test to the CNCI or its designate by the next business day following receipt by the Facility of such notification from the CFIA.

VI. The Facility hereby releases, indemnifies and saves harmless the Canadian Nursery and Landscape Association, the Canadian Nursery Certification Institute, the BC Ministry of Agriculture and Lands, and any associated organizations, their elected and appointed officials, employees and agents, from and against any and all liability, actions, causes of action, claims, damages, expenses, costs, debts, demands or losses suffered or incurred by the Canadian Nursery and Landscape Association, the CNCI, the BC Ministry of Agriculture and Lands, and/or any associated organizations arising from the granting or existence of this Agreement, from the performance by the Facility of this Agreement or any default of the Facility under or in respect of this Agreement.

VII. The Facility acknowledges and agrees that the Standard is subject to change and agrees to implement any required changes within a reasonable time after written notification thereof has been received by the Facility from the CNCI. The definition of a reasonable time will be determined by the CNCI in its sole discretion.

VIII. This Agreement is effective on the date of signing, and shall remain in effect until cancelled by either party by written notice delivered to the other at the mailing address appearing above. Notices may be given by mail, in which case they shall be deemed to have been received 5 business days after the date of mailing, or by personal delivery, in which case they shall be deemed to have been received on the date of delivery.

IN WITNESS WHEREOF, the parties have executed this Agreement, intending to be legally bound.

CANADIAN NURSERY CERTIFICATION INSTITUTE	**(Nursery Name)**
Per:_____	Per:_____
Authorized Signatory	Authorized Signatory
Date: _____	Date: _____

Fact Sheet

Record Keeping & Traceability

Record keeping and traceability of plant movement enables quick determination of where a pest has entered and moved within the facility and when and where it has been shipped out. It is a basic requirement for all nursery certification programs.

- If you are presently keeping one invoice or Delivery memo for accounting purposes, photocopy it and place in an 'Incoming and Outgoing Shipment Records' file.
- One 'Incoming and Outgoing Shipment Records' file should be consolidated for all nursery certification programs, i.e. CNCP or DPCP and *P. ramorum*.

Recording Incoming and Outgoing Plants:

Nursery facilities have a variety of forms to record sales or purchases. Larger nurseries have comprehensive software systems whereas smaller growers will either have manual invoicing or handwritten documents.

- Your Delivery Memo or Invoice is sufficient as a record for incoming or outgoing plants. The receiver should also provide the visual inspection notation for *P. ramorum* on the document, noting any plant health issues and then initialling the invoice.
- To the right is an example of a 'check-off' stamp that growers may wish to develop – growers may include whatever information they feel best meet the Standard's requirements.

☐ *P. ramorum* Visual Inspection completed

Plant source is ☐ P.r Certified ☐ Not Certified

☐ No visual symptoms

Leaf disease noted on _____

☐ Refuse plants

☐ Move to isolation

☐ Leaf disease noted as _____

☐ Move into production facility

Recording incoming shipments of soilless media and organic ingredients

- A copy of the invoice is sufficient.
- Soilless media and organic ingredients do not need to be certified.

Up to Date Map of Facility:

- The map should show buildings, roadways and beds, including isolation blocks and two meter buffers.
- Include road names approximate dimensions, entry addresses and distinguishing markers, particularly for fields away from the home facility.
- The map does not need to be detailed, but should show the activities in each area, i.e. shipping, propagating house, etc..
- If there is standard plant movement or rotation, this should be noted on the map, i.e. plants move from propagation house to greenhouse to potting shed to production bed, and then shipped.
- High risk host plant beds should also be noted.

Visitor's Log Book:

To maintain records of movement on or off the nursery, the facility may determine that Visitor's Log Book be part of the recorded data. Refer to Appendix VII– 'Fact Sheet Biosecurity' for further details.

Fact Sheet

P. ramorum Sampling Protocols

Internal Sampling and Sampling of Incoming Plants

This section provides guidelines on sampling of incoming plant shipments and on-site sampling of plants with suspicious symptoms. This sampling may be carried out by qualified nursery employees or contractors.

- *Finding* P. ramorum *at its early stages of infestation will minimize introduction to the rest of the nursery and out to customers.*
- *Detecting* P. ramorum *on incoming plants will minimize destruction requirements if a positive is detected in an isolation block.*
- *Sampling and testing of symptomatic plant material to identify pest issues is a major component of all nursery certification programs.*

If incoming plants originate from approved *P. ramorum*-certified sources:

- Upon visual inspection, being found 'clean', they may be placed into a *P. ramorum*-certified area of the nursery
- If host plants are found with physical symptoms resembling *P. ramorum*, their treatment should be outlined in the Nursery Certification Manual. This could include refusing the shipment, immediate destruction, sampling and testing, isolation, etc.
- If non-host plants are found with physical symptoms resembling *P. ramorum*, their treatment should be outlined in the Nursery Certification Manual.

If the plants originate from sources which are not approved by the CNCI:

- The host plants must be placed in isolation blocks as outlined in the Standard. These plants must be sampled, tested and found free of *Phytophthora ramorum* before being released into the *P. ramorum*-certified areas of the nursery.
- The non-host plants must be visually inspected, and if found with symptoms, treated as outlined the Nursery Certification Manual. If no symptoms are found, they may be placed into the production facility.

Many growers are now using Pocket Diagnostic kits to screen for *Phytophthora* species. As these kits test for all phytophthoras, not just *P. ramorum*, this test is used as a pre-screen to determine if any phytophthoras are present. If a phytophthora is present (and there are over 25 species in BC), then the grower may either decide to simply destroy all the plants in order to maintain the pest-free status, or may choose to have the plants tested in a laboratory for a definitive diagnosis.

I. Preparing for Sampling

Equipment needs:

- Ziploc bags with paper towel
- Permanent markers
- Disinfectants (e.g. Zep Pine Disinfectant, Lysol, Virkon, Chemprocide or a 10% bleach solution),
- Hand sanitizer (e.g. OneStep, Wet Ones antibacterial wipes)
- Hand-held pruning shears (optional)
- Cooler
- Flagging tape
- Labels
- *P. ramorum* symptoms guide

Sanitation

- Use a hand-sanitizer to clean hands between sample collections and before leaving an isolation block.
- Use a spray bottle containing a disinfectant over all tools.
- Clean all soil or growing media from boots or shoes and spray boots with disinfectant before leaving an isolation block.
- Follow decontamination procedures before and after taking each sample.

II. Sample Collection and Packaging

Sample Selection:

For Incoming Shipments:

- When plant shipments arrive at the nursery determine their origin.
- Obtain a copy of the invoice or packing slip covering the shipment.
- Verify the shipment received against the shipment invoice or packing slip.
- Visually inspect the shipment.
- Follow requirements as noted earlier in this Fact Sheet.

For Plants with Suspicious Symptoms in the Certified Production Nursery:

- Take one sample of suspicious plant material, taking 12-15 leaves for each sample from the same block of plants (species) as noted below. If several species show similar symptoms, take separate samples from each species.

Sample Size

Collect 12 - 15 leaves for each sample.

- If possible, take 1-2 leaves with symptoms from each plant sampled.
- Symptomatic leaves fallen in the immediate vicinity or on the potting soil can also be collected in a sample.
- Collected fallen leaves must still be in good condition.
- Symptomatic shoot tips collected from conifers would be appropriate for sample collection.
- Asymptomatic leaf and/or stem samples may ONLY be collected if NO symptomatic plants of any of the known host genera are present.
- When possible, samples should contain leaves with a range of symptoms.

Block Identification

Use flagging tape to identify the block where the plant sample was taken and write the sample # on the flagging tape corresponding to the number assigned on the sample bag.

III. Initial (Pre-screen) Testing for Phytophthora using 'ELISA' Pocket Diagnostic kits.

Kits are available through horticultural supply companies in Canada as well as Europe and the USA. Some kits test for all phytophthoras, some for *P. ramorum* specifically. These test kits are indicators and should not be used solely to provide definitive diagnostics. Follow directions on the kit.

IV. Readying Samples for Further Laboratory Testing

The BCMAL lab provides many diagnostic services. The *P. ramorum* diagnostic test will test for all phytophthoras first, and then test for *P. ramorum* specifically.

Sample Packaging

1. When collecting tissue samples, put the sample and a dry paper towel in a Ziploc bag.
2. Shake off excess water on the leaves, if present.
3. Label each bag clearly and completely (Sampler's name, file #, full host name (genus, species and variety), block #, date collected and sample #).
4. Flatten the bag (removing air) and close the zip.
5. Place all sample bags into a second larger bag and then into a cooler.
6. Label the package "*P. ramorum* SAMPLES".
7. Deliver the samples to the CNCI designated location.

   At the present time, the designated lab is the:

   BC Ministry of Agriculture & Lands Diagnostic Laboratory
   1767 Angus Campbell Road
   Abbotsford, BC V3G 2M3

   Phone: 1-888-221-7141

Notification

Ensure that transportation has been arranged such that samples will be delivered to the laboratory as close to 24-48 hours of collection as possible.

Do not send the samples by courier on a Friday.

V. DO'S AND DON'TS OF SAMPLE COLLECTING

Do:

- Wash all debris from sampling tools as noted under sanitation.
- Spray boots with bleach or other disinfectant, brush and rinse them before leaving each nursery facility.
- Attach labels on the outside of bags since labels inside the bag may deteriorate due to moisture and become illegible.
- Include on all labels with a permanent marker: time, date, collector's identification number, location of sample site, full host name and sample number.
- Keep the samples cool: place in foam cooler with ice packs.

Do not:

- Do not add extra moisture to the sample to keep it fresh. The extra moisture will actually speed deterioration of the sample.
- Do not leave samples in sunlight, allow them to dry out, or allow them to get hot.

Acknowledgements: This sampling protocol has been adapted from the United States Department of Agriculture Phytophthora ramorum *2004 National Survey Sampling Protocol, and the Oregon Department of Agriculture:* P. ramorum *Pathogen-free Certification*

FACT SHEET

Nursery Production Practices (BMP's)

The application of effective BMP's during the nursery production cycle is another piece of the systems approach that helps minimize the risk of infestation in a facility.

P. ramorum is a pathogen that is soil and water borne, and can infect via roots, leaves and young stems.

- Spores are easily detached from an infected plant when leaves are wet, so transfer to the soil, clothing and equipment is effortless. This wetness can be due to natural weather conditions like rain or fog or other cultural practices such as overhead irrigation or misting.
- Spores in the soil move easily in water with their fin-like flagella.
- Cut or injured plant surfaces are very susceptible to *P. ramorum* spores, and even more so in the presence of free moisture.

P. ramorum is Mobile in Wet Conditions

Minimizing the potential movement of the pathogen in water is a critical factor for growers to consider when planning their production practices:

- It is highly recommended that all host plants should be grown in areas with minimal standing water of puddling to decrease the degree to which the pathogen could dislodge and move among nursery plants. One nursery was confirmed with a low incidence of *P. ramorum* one year; the following winter flooding took place, and over the next season, many new positives were detected. Scientists suspect that the flooding enabled the spores to move around the nursery and be taken up into the roots, spreading through the nursery and infecting many more plants. This was despite eradication efforts.
- To minimize spore movement by persons or equipment, growers should review their production schedules and practices to take into consideration how *P. ramorum* moves when it is active. This could mean avoiding working in beds with host plants during rainy periods, or possibly only working in host plant beds at the end of the day with subsequent sanitation of clothing and tools. Whatever policy is determined should be included in the Nursery Certification Manual.
- Growers must also develop their Integrated Pest Management program based on their risk of contracting *P. ramorum*:
    - Facilities which run only closed production and have no incoming stock or outside visitors have a low risk of contracting the disease.
    - Facilities that purchase a large amount of stock, including host plants, from a variety of suppliers have a much larger risk of importing the disease unknowingly.
    - Facilities that purchase a large proportion of high risk host plants from a variety of sources, particularly rhododendrons have a much higher risk of contracting *P. ramorum* than the previous two instances.

A pest management program, in cases where there is higher risk, may include preventative applications of fungicides to minimize sporulation and infection under optimum conditions (warm and wet). In this case, the grower may determine that their IPM program include alternating fungicide sprays of Aliette and Subdue MAXX at times when overhead irrigation is required, or prior to an anticipated long period of rainfall.

***P. ramorum* will survive in soil and plant debris.**

Although *P. ramorum* sporulates on leaves of plants, spores will drop and survive in the soil and on debris that falls.

- *P. ramorum* has been found in cull piles and in debris at the base of plants in BC.
- Plants with *P. ramorum* will often shed their infected leaves which, if not gathered and disposed, will provide a suitable environment for a long-lived source of infection.
- Debris should be collected and disposed of off-site whenever possible. This may occur during winterization, when moving beds, when potting up, etc.
- When leaves are wet, spores are easily dislodged, thus collection should take place during dry times.
- Growers should consider their degree of risk and determine what debris removal policy should be included in the nursery manual to minimize the risk of creating a suitable environment for sporulation and spore survival.

High Risk Host Plants

The three high risk hosts – rhododendrons, camellias and viburnums, are responsible for over 85% of the outbreaks of *P. ramorum* and are usually in close proximity to other plants that also become infected.

CFIA also considers *Pieris, Kalmia* and *Syringa* to be High Risk Hosts, and growers should also consider treating these similarly if they wish to minimize their risks even further.

The BMP's as noted for General Nursery Production also apply toHigh Risk Host Plants.

Since both camellias and rhododendrons often show few symptoms, extra precautions are required when producing these plants. Viburnum is often symptomatic and will show symptoms very quickly. Note that infection during optimum conditions only takes 12 hours; symptoms may show in as little as 72 hours - or not at all.

- High risk hosts must be segregated from other host and non-host plants to minimize the chance of infection by water movement or spores becoming dislodged by wind under wet conditions.
- The two meter buffer (canopy to canopy) is a minimum for these plants. If plants are tall (over 1 meter), growers may wish to provide an even wider buffer.
    - The issue of free moisture is even more significant with high risk hosts than with other plants, thus making the requirement for minimal standing water or puddling mandatory Growers should move these plants to high areas, or contain them in raised beds, or provide other means to ensure that water drains away quickly.
    - Reducing leaf wetness to less than 6 hours is highly recommended when using overhead irrigation.
- In BC, leaf spots and dieback are the most common symptoms of *P. ramorum*. The quickest way to assess if the plant has *P. ramorum* or another similar disease is to have the 'spots or dieback' diagnosed. There are two options for diagnosis:
    - The Diagnostic Lab at the BC Ministry of Agriculture and Lands provide ELISA testing as well as nested PCR to determine if the sample is positive for *P. ramorum*, as do several labs across Canada and Europe. The BCMAL lab is required to report all positives for *P. ramorum* to CFIA.
    - You may purchase a 'hand-held' ELISA testing kit to test on-site.

Diagnostic Procedures and Outcomes:

- The ELISA tests will diagnose to the level of genus of pathogen.
    - If an ELISA comes back positive, it means that there is a *Phythophthora* (species unspecified) present in the plant.
    - It does not mean that *P. ramorum* is detected specifically.
    - At this point of detection, you may choose to destroy the plants that have tested positive for P*hytophthora* spp. as part of a regular 'clean stock;' program. A guideline would be to destroy plants within two meters of the plant as well as any others that are

symptomatic.

- If you wish to determine what type of *Phytophthora* is present, another step of testing must be performed. This will determine what type of *Phytophthora* is present. If *P. ramorum* is confirmed, the CFIA will be called (as required by law) to confirm the test results. If CFIA's tests confirm the positive, then the Infested Nursery Action Plan is enforced.

FACT SHEET

Biosecurity

Biosecurity measures increase the chances of *P. ramorum* spores being controlled or removed from your premises before they have a chance to take hold.

All *P. ramorum* infections come from sources outside of BC nurseries. However, once a nursery has been infected, it is very difficult to eradicate without extreme measures.

Prevention of *P. ramorum* coming on to the nursery is a critical factor to a nursery's continuing growth and prosperity – both in the short and long term.

Biosecurity measures must be implemented considering the degree of risk of the facility, its plant suppliers and the amount of 'traffic' – people, tools, equipment.

Upon review of your risk factors, your style of operation, your source of plants and incoming traffic, you must write out a 'Biosecurity Policy' in your Nursery Certification Manual that you will implement in your facility.

Biosecurity measures attempt to significantly decrease the risk of bringing *P. ramorum* in via people or equipment.

- *P. ramorum* spores are easily dislodged from wet leaves onto clothing and the ground
- *P. ramorum* spores can linger in dropped leaves and plant debris and be picked up on footwear and tools
- *P. ramorum* spores can be controlled on surfaces using proper disinfection and sanitation techniques
- Determine what measures YOU can take in your nursery and on incoming people, equipment and tools to destroy viable spores.

In your Nursery Certification Manual, you will write how you will manage:

- To keep potentially infected plants in your isolation area from infecting your main production area
- Visitors, including customers
- Workers – both coming on-site and working on your facility – including in the high-risk host and segregated areas
- The flow of plants through the nursery and into the shipping area
- To stop plants from re-entering your 'clean' area once they have left your site

Following are some of the areas to consider and define in your Nursery Certification Manual:

Visitor Policy:

- How are you going to determine if a person has the potential to move spores into your nursery?
- A visitor policy must include what questions you should ask of your guests and how you will perform this task. The most common one is a Visitor's log or 'Guest Book with several questions, outlined as

follows. This log book can also provide you with any other information about your potential client that you wish.

Name	Company	Have you visited another nursery or farm in the last 24 hours?	If so, where?	Would you like to be on our mailing list?

- Your visitor policy should also outline under what circumstance actions are required to ensure the visitor does not bring in *P. ramorum*.
    - It must be an action that would effectively stop *P. ramorum*, i.e. all visitors with prior visits to other nurseries must use 'clean boots' provided, or wear disposable booties, or step in an antiseptic bath, or only be allowed to ride on the gator when in the nursery.
    - The choice is up to you, as you are trying to prevent P. *ramorum* coming on to your nursery. **Be pro-active – it's your business at stake!**

Isolation areas and Segregated 'High Risk Host Plants'

These are both critical areas where traffic should be managed carefully to minimize spore transfer. You must decide on the policy for movement of staff, vehicles and tools when moving from isolation areas, the high risk segregation blocks or your 'hot' area in your shipping zone i.e.

- You may require that a set of equipment and clothing be used for each of the specific areas, not to be used in any other part of the nursery to limit the chance of spore transfer
- You may require that truck, gator and trailer beds be sanitized after moving plants to and from these beds, or after driving onto truck beds
- You may require workers to stop at disinfectant 'stations' using spray bottles and cloths to wipe blades, and hand sanitizers to kills spores on hands prior to moving into the regular production areas.
- You may require that no work be done while leaves are wet, if this is possible. Alternately, you may decide that workers should work in the high-risk beds only at the end of the day, before leaving for the day.

Vehicle Sanitation:

- As there is evidence that spores can live in soil for several years, growers should consider their risk of incoming spores on vehicles.
- Growers may choose to spray tires, or require trucks to remain in a 'hot' zone in the shipping area to minimize the chance of importing *P. ramorum.*

- Any debris from vehicles should be bagged and disposed off-site. No sweeping of debris onto the parking lot or adjacent areas.
- Your policy decisions must be included in your Nursery Certification Manual.

Contract Workers

Contract workers should go through a sanitation process before moving onto your nursery. As these workers move from facility to facility, they are a risk to your operation.

- Clothing and footwear should be clean. You may wish to require their boots be sprayed with a disinfectant.
- Tools, equipment and machinery should be sanitized before entering the production area.
- Vehicle tires should also be sanitized if these 'outside' vehicles transport workers into the nursery production area.

Sanitation for Staff:

Based on your degree of risk, you may set your sanitation policy at any one of many levels to minimize the chances of *P. ramorum* spores moving around the nursery:

- You may choose to require clean clothing at the start of each workday, including washed boots and clean gloves.
- You may decide, in the instance of low risk, that boots be sanitized before entering the facility and hands washed with antiseptic soap prior to starting work.
- You may wish to provide clothing, i.e. overalls, T-shirts, sweatshirts for your staff to wear on-site.

Whatever you decide, it must be included in your Nursery Certification Manual.

FACT SHEET

Integrated Pest Management (IPM) Program for *P. ramorum*

Integrated pest management (IPM) is a decision-making process that uses all available techniques to manage pests. The program attempts to optimize growing conditions for the crop while making the conditions less favourable for pest development. The key components of a nursery IPM program are discussed elsewhere in the Standard, for instance:

- Information on the biology and spread of *P. ramorum* is covered in Appendix VI,
- Steps to take to reduce the risk of introducing *P. ramorum* to a site are covered in Appendix VII (Biosecurity),
- Information on disinfectants registered for use in the biosecurity program are outlined in Appendix IX,
- Routine monitoring for *P. ramorum* is covered in Sections 5.4 and 5.6, and
- Production practices that will reduce the risk of *P. ramorum* establishment and spread at a site (e.g. managing leaf debris and leaf wetness) are covered in Section 5.8.

The component of an IPM program that is covered in this appendix is preventive fungicide applications. The decision to spray a crop should be based on the level of risk that it may be infected with *P. ramorum*. When to apply preventive fungicide sprays and which products to use are also covered.

Assessing the Level of Risk that a Crop may have *P. ramorum*

Growers should determine whether or not a particular crop needs to be sprayed on the level of risk that it is infected with *P. ramorum*. There are many factors that influence risk, including the type of crop, where it was sourced, and aspects of the production system. These points are summarized in Table 1. Crops that are rated as "Higher Risk" in one or more of the categories may be included in the spray program, depending on the level of risk the nursery is willing to accept.

Nurseries that have a history of purchasing a large proportion of high risk host plants from a variety of sources, or have previously had a P. *ramorum* detection, are the most at risk. Correspondingly, their IPM programs likely would be the most rigorous. The Canadian Food Inspection Agency is currently developing a set of mandatory best management practices for implementation at positive nurseries. The positive nursery will be required to implement the practices before they are released from quarantine. This additional step is necessary to reduce the re-occurrence of detections at facilities following the implementation of the infested nursery protocol.

Table 1. Some points that influence the level of risk that a crop may become infected with *P. ramorum*. This information should be used when evaluating whether a crop needs to be sprayed and the frequency of fungicide application. Please note that the level of risk is not equivalent for all of the items within the "Higher Risk" column.

Source of Risk	Lower Risk	Higher Risk
Crop (genus)	• not a high risk host	• a high risk host (e.g. *Camellia*, *Rhododendron*, and *Viburnum*)[1]
Source of Plant	• stock propagated in-house • tissue culture plants received in culture • stock from a state/province other than British Columbia, California, Oregon and Washington[4]	• stock purchased from a nursery in California, Oregon, and Washington, or in the European Union and Switzerland[2] • stock from a non-certified nursery in British Columbia[3]
Production System	• field-grown[5] • greenhouse stock	• container-grown stock • stock held in overwintering houses - managing condensation drip is important to reduce risk
Irrigation System	• drip, trickle, sub-irrigation system	• overhead irrigation

[1] *Camellia*, *Rhododendron*, and *Viburnum* are considered high risk hosts because the majority of nursery detections have been on them. In 2004 and 2005, there were 188 detections of *P. ramorum* in BC. *Rhododendron* accounted for 51% of the detections, followed by *Camellia* at 19%, and *Viburnum* at 7%.

[2] Plants brought onto a nursery from other locations pose the greatest risk of introducing *P. ramorum* to the nursery. However, monitoring at delivery is not necessarily adequate to detect infected plants. The nursery should decide whether to take additional precautions with incoming stock even if it is not formally required to go into isolation. Oregon growers are encouraged to set aside 100 plants or 10% of each lot (whichever is greater) of imported host plants. These plants are not to be treated with any fungicide that is effective against *Phytophthora* species for 3 to 6 months. During this period, the plants are observed for *P. ramorum* symptoms. This holding period provides an opportunity for disease suppressive fungicides to wear off and/or the occurrence of favorable weather conditions that will result in disease development.

[3] The Canadian *P. ramorum Nursery Certification Standard* requires stock purchased from a non-certified nursery in British Columbia to be placed in isolation upon receipt. Plants in isolation cannot be treated with fungicides as per Section 5.2 of the *P. ramorum National Certification Standard*.

[4] *P. ramorum* has been detected at facilities in the Midwest and eastern seaboard of the US. To evaluate the risk level of a supplier's stock, it is prudent to ask for details on their *P. ramorum* program and about detections in their area.

[5] Field-grown production has been classified as "lower risk" because there have been relatively few detections of *P. ramorum* on it relative to container stock. This is perhaps due to wider plant spacing and less frequent overhead irrigation. Field stock that is grown at a high density (e.g. seed beds) may be "higher risk".

When Should the Fungicide Sprays be Applied?

Once it has been determined which crops require fungicide sprays, the grower needs to decide under what conditions the stock will be sprayed.

- Apply fungicides prior to infection - ***There are no fungicides that can eradicate P. ramorum from a plant.***
    - The available fungicides act by preventing new infections and by suppressing growth of the pathogen within the plant. They do not kill *P. ramorum*.
    - For this reason, it is critical to apply fungicides as preventive treatments, prior to infection.
    - Once *P. ramorum* has infected the host, fungicides will only temporarily stop its growth.
    - Once the chemical activity subsides, *P. ramorum* will resume growth.
- Apply prior to extended rainy periods in the spring and fall - *P. ramorum* is a water mould and its disease cycle is dependent on water.
    - Spores produced by leaf and shoot tip infections are responsible for disease spread.
    - Cool and damp conditions (6 to 12 hours of leaf wetness) are required for spore germination and infection to occur.
    - Based on laboratory trials, the optimum temperature for infection is between 16 and 25^{o}C, but infection can occur from 2 to 28^{o}C.
    - Nursery outbreaks of *P. ramorum* in North America and Europe have been associated with extended rainy periods.
    - The fall period appears to be particularly important for disease development and spread.
    - The environment in an overwintering polyhouse may be conducive to infection and spread throughout the winter.
- Apply when there is new vegetative growth.
    - Young foliage is often more susceptible to *P. ramorum*.
    - Research on *Pseudotsuga menziesii* has found that shoots are only susceptible to infection immediately after bud break (Chastagner et al., 2004). The shoots were not susceptible 2 to 8 weeks later.
- Apply fungicides following activities that create wounds on the stock –
    - Research has demonstrated that wounds are attractive entry points for *P. ramorum* spores.
    - Apply a preventive spray following pruning or other cultural activities that create wounds on the plants.

What Fungicides Should I Use and How Often Should they be Applied?

- Subdue MAXX® and Aliette® currently have emergency registration for *P. ramorum* in British Columbia;

- Daconil® is registered to control Phytophthora dieback on *Rhododendron* and *Pieris*.
- Fungicides act primarily to protect plants from new infections and should be applied preventively when conditions are favourable for *P. ramorum* infection.
- Rotate fungicides –
    - repeated application of a single fungicide, particularly Subdue MAXX®, or of fungicides in the same chemical group can lead to the development of pest resistance. A strain of *P. ramorum* that is less sensitive to Subdue MAXX® has already been detected in Belgium.
    - To delay the development of fungicide resistance, it is important to rotate the use of fungicides that belong to different resistance management groups. Subdue MAXX®, Aliette®, and Daconil® are all in different fungicide groups and can be used as rotational products.
- Subdue MAXX® should be the first preventive spray applied, followed by sprays of Aliette® and/or Daconil® on a 2 to 3 week schedule while conditions favour development of *P. ramorum.*
    - Subdue MAXX® has provided a high level of protection in most research trials and is registered for a broad range of ornamental crops. Research has shown that Subdue MAXX® is effective for 2 to 3 weeks. For *P. ramorum,* foliar sprays of Subdue MAXX® are more effective than root drenches.

    Aliette® and Daconil® are somewhat less effective than Subdue MAXX®.
    - Aliette® has a broad registration while Daconil 2787 F® is only registered to control Phytophthora dieback on *Rhododendron* and *Pieris*.
    - Consider applying the rotational fungicides beginning 2 to 3 weeks after the application of Subdue MAXX®.
    - Note that only 3 applications of Subdue MAXX® and 4 applications of Aliette® are permitted per crop per year.
- Thorough spray coverage increases fungicide efficacy –
    - spores infect primarily through the lower surface of the leaf although the pathogen can also enter through wounds.
    - Good fungicide coverage, in particular of the lower leaf surface, improves the efficacy of the treatment. This is especially important for Daconil® which is a contact fungicide (non-systemic).
- Records of all fungicide applications must be maintained at the nursery as per federal or provincial regulatory agency requirements (Section 4.5 of the *Phytophthora ramorum National Certification Standards*).

Additional Information on the Registered Fungicides

Chipco Aliette T&O Fungicide® (fosetyl-al) –

- is registered to suppress *P. ramorum* in greenhouse and field-grown ornamental plants in nurseries and landscape plantings, and conifers grown in nurseries and landscape plantations.

- It is registered for application as a foliar or drench treatment.
    - Apply to the foliage at 5 kg of product per hectare in a water volume not greater than 1000 L/ha. Spray to wet, but not to run-off.
    - For drench treatments, use the appropriate dose rate as indicated in the pesticide label. Apply as a high volume coarse spray (5 L of water per tree), using a handgun to drench the trunk and soil surrounding the tree. Repeat application if necessary 2-3 weeks later. Treat when there is sufficient leaf area present to take up the spray; when leaves are actively growing, and at least 30 days prior to leaf drop in deciduous species. Aliette® is in the "U" Fungicide Resistance Management Group.
    - Do not apply more than 4 applications per year.
    - *This product was registered through the emergency registration program and the registration only applies to British Columbia. This registration will expire on September 30, 2007*.

Subdue MAXX® Fungicide (metalaxyl-m) is registered to control *Phytophthora* spp., including *P. ramorum*, on greenhouse and field-grown ornamental plants in nurseries and landscape plantings, and conifers grown in nurseries and landscape plantations.

- Apply prior to infection, since preventive applications have been shown to be more efficacious than post-infection applications for *Phytophthora* spp.
- For field grown nursery stock, apply as a foliar spray to run-off at the rate of 7.8-15.6 mL of product in 100 L of water.
- For container grown nursery stock, drench at 24 to 40 mL in 1000 L of water and apply 5 L of solution per m^2.
- Use the lower rate for seedlings and the higher rate for transplants.
- Subdue MAXX® is in Fungicide Resistance Management Group "4".
- Use in a rotational program with other fungicides belonging to different group(s) for resistance management.
- Repeat applications if necessary at 2-3 month intervals.
- Do not apply more than 3 applications per year.
- *This product was registered through the emergency registration program and the registration only applies to British Columbia. This registration will expire on September 30, 2007*.

Daconil 2787 F® (chlorothalonil)

- Is registered to control Phytophthora dieback of *Rhododendron* and *Pieris*, and for other diseases on a range of ornamentals.
- Apply at the rate of 2.5 liters per 1000 L of water.

- Apply sufficient spray to obtain adequate coverage, but do not exceed 2000 L of water per hectare.
- Repeat on a 7 to 14 day schedule until conditions are no longer favourable for disease development.
- Daconil® is in Fungicide Resistance Management Group "M".
- Do not apply more than 3 applications per year.

Other Fungicides – at the time of writing, no other fungicides were labelled to control *P. ramorum* on ornamental crops. Efforts, however, are underway to get full minor use registrations for Aliette® and Subdue MAXX®, and for Dithane® (mancozeb) and Acrobat® (dimethomorph).

FACT SHEET

Disinfection & Sanitation in Nurseries

The following information is meant to provide growers with options for bio-security and sanitation measures, dependent on the degree of risk in their facility.

P. ramorum can be spread by the movement of infected plants and of contaminated soil, water, and plant debris alone or on vehicles, equipment / tools, and workers. In order to reduce the risk of introducing and spreading *P. ramorum*, a nursery needs to adopt an integrated approach that may include exclusion (restrict access), supplier selection, cultural practices, and sanitation.

Sanitation is an important component of a nursery's *P. ramorum* biosecurity program. Nursery sanitation guidelines include:

- Collect fallen leaves for disposal;
- Propagate from clean stock plants;
- Test surface or recycled irrigation water for *Phytophthora* spp.; treat if present;
- Use new pots, if you must re-use pots, clean them first;
- Off-load shipments in an area that can be cleaned of leafy debris – bag and dispose;
- Take steps to prevent pathogen spread on workers, vehicles, equipment, tools, and on production beds between crops;
- Ensure compost used in media has undergone a sufficient period of high temperature (>55^{o}C for 14 days) to eliminate pathogens;
- Do not store potting media on bare soil; and
- Consider the spread of pathogens from the cull pile to production areas.

The removal of debris from surfaces will greatly reduce the risk of *P. ramorum* spread. However, at times it may be desirable to more rigorously sanitize a surface. This can be achieved with the application of a disinfectant. Disinfectants are oxidizing agents that kill microorganisms. Some common disinfectants used at nurseries include alcohols (e.g. ethanol, isopropanol), halogens (e.g. chlorine bleach), peroxides (e.g. Hyperox®, Virkon®), and quaternary ammonium (e.g. Chemprocide®, Virocid®). All of these disinfectants are fast-acting, broad spectrum and low toxicity biocides.

There are a number of factors to consider when selecting a disinfectant. Some of these factors are presented in Table 1. Other factors to consider are safety to workers and the environment. Disinfectants can irritate eyes, skin and/or mucous membranes. Use safety equipment recommended on the label when mixing, loading and applying disinfectants. Never mix bleach with ammonia or acidic solutions because these combinations will produce toxic chlorine gas.

Table 1. Factors to consider when selecting a disinfectant.

Disinfectant	Factors that Reduce Disinfectant Efficacy	Corrosive	Residual Activity
Alcohol	• organic matter (alcohol does not readily penetrate organic matter) • too high a concentration of alcohol (>90%)	no	low
Bleach	• bleach is unstable and efficacy is reduced by organic matter, sunlight, water pH, and temperatures below 20^{o}C	yes (to metals)	low
Peroxide	• organic matter • sunlight	moderate (to metals)	limited
Quaternary Ammonium	• soap • hard water (>400 ppm Ca^{+2})	no	good (9-day ½-life in soil)

Prior to disinfecting a surface, it is critical that it is free of soil and organic matter. Always clean and rinse soiled surfaces prior to applying disinfectants. Textured surfaces will require additional cleaning. It is also important to remove inorganic salt deposits because they can shield spores from the disinfectant. An acid-based cleaner will be necessary to remove salt deposits.

Disinfectants for Staff and Visitors:

Locate hand wash stations and foot baths at entrances to the facility, and to greenhouses and isolation blocks.

Hand wash stations - antimicrobial hand soaps (e.g. OneStep®, Purell® Hand Sanitizer) are a reasonable substitute for hand washing as long as they are not visibly soiled. These products usually contain alcohol in a quick-drying gel formulation.

Foot bath or boot spray – a plastic tub lined with foam can be used as a foot bath. Put a lid on the tub to reduce evaporation and to prevent pets from consuming the disinfectant solution. There are also foot bath mats that can be purchased from a number of local agriculture suppliers. The foot bath will not be too effective on soiled footwear. Footwear should be exposed to the foot bath solution for at least 30 seconds.

- Virkon® (1% or 10 g/L) – change weekly; use test strips to measure disinfectant activity
- Chemprocide® (1.5% or 15 g/L) – change biweekly; use test strips to measure disinfectant activity
- Hyperox® (0.8% or 8 g/L) – change solution daily or when soiled

Quick Dip Disinfectant Treatments for Tools/Cutting Knives: there are pruners on the market that automatically apply a disinfectant solution to the blades when a cut is made.

- 70% alcohol
- 10% household bleach (prepare by mixing 100 mL of bleach in 900 mL of water). Caution: bleach solutions are corrosive to metals.

- 0.1 or 0.2 % Chemprocide® (mix 1 or 2 mL of Chemprocide® per litre of water). Use the lower rate for plants that are sensitive to Chemprocide®. Due to its long residual period, toxic levels of Chemprocide® can accumulate on cutting tools. Periodically rinse the blades to remove the disinfectant residue
- 5% Virkon® (dissolve 50 g in one litre of water)

Disinfection of Production Areas:

- Chemprocide® is the only disinfectant registered for use in greenhouses. Thoroughly wet the surface and do not rinse off. Use 8 mL of Chemprocide® per litre of water for greenhouse surfaces and equipment. Use 30 mL of Chemprocide® per litre of water for wood, painted and concrete surfaces.

Disinfection of Vehicles:

- Clean the truck in a commercial vehicle steam-cleaning facility before returning to the nursery. Steam cleaning will significantly reduce the risk of *P. ramorum* propagules being present on the vehicle.
- Chemprocide® - Pace Chemicals recommends applying Chemprocide® at the rate of 4 mL per litre of water to disinfect the box of shipping vehicles. If there are plants in the box, the rate is to be reduced to 1 mL per litre of water.
- Virkon® - wash and rinse all surfaces of the vehicle prior to disinfection. Disinfect all vehicle surfaces inside and outside using a 1% dilution rate (= 1 mL Virkon® + 99 mL of water). The inside of the cab can be wiped down with a cloth soaked in Virkon®. (**From:** "Vehicle Biosecurity Procedure Checklist" produced by the manufacturer of Virkon®, Vetoquinol).

Appendix X: P. ramorum Compliance Checklist

Use this checklist for your twice-yearly internal audit

Question	Yes/ No	Documentation/Action Required
1.0 Introduction		
1.1Applicants Have you enabled your CFIA sampling and test results to apply to the Certification sample requirements?		Fill in the *P. ramorum* Information Release Agreement and fax it in for processing.
1.1 Applicants Has the conditions of the *P. ramorum* Certification Compliance Standard and the mandatory practices and biosecurity measures been implemented?		o Assemble documents required by the *P. ramorum* Certification Compliance Agreement o Implement the conditions listed o Identify, document and implement mandatory practices and biosecurity measures
1.1 Applicants Has the *P. ramorum* Compliance Agreement been signed?		Sign *P. ramorum* Certification Compliance Agreement

2.0 Responsibilities of Management and Key Personnel		
Has an **Administrative Manager** been designated?		Responsibilities: • Administrates record keeping, inventory management, and plant traceability • Ensures that documentation is accessible for internal and external audits (archived for 7 years) • Develops a program, which complies with the standards outlined in the *P. ramorum* Certification Compliance Agreement • Oversees preventative and corrective actions identified by auditors • Reviews and verifies that the program is working • Hires and/or trains sufficient number of staff to implement requirements of the *P. ramorum* Certification Standard
Has an **Implementation Manager** been designated?		Responsibilities: • Organizes and implements the operational procedures with nursery staff • Initiates preventative and corrective actions
Has Internal Self-Audit procedure been organized?		• Administrative Manager designates the internal auditor • Internal Auditor verifies that certification processes have been correctly implemented (See Section 6.1)

3.0 Evaluation of Nursery		
Has your nursery been sampled, tested for *P. ramorum* by CFIA or CNCI designates (yearly testing)? Has there been no evidence of the disease found? Have the mandatory Best Management Practices been implemented?		• Request that CFIA, or designates of the CNCI, sample and test your nursery facility (request annually after acceptance into the *P. ramorum* Certification System). • Results of the testing must be negative. • Implement mandatory Best Management Practices as outlined in Section 5.8.
4.0 Record Keeping and Traceability		
Is there a nursery map, readily available? Is there an up-to-date copy of the Canadian *P. ramorum* Nursery Certification Standard available to nursery staff and auditors? Is there a copy of the *P. ramorum* Nursery Certification Manual available to nursery staff and auditors?		• A nursery map, which indicates an identification number or code for every production area (field, block, bed, greenhouse, etc.), must be readily available and posted at the nursery. • Copy of the *P. ramorum* Canadian Certification Standard • Copy of the *P. ramorum* Nursery Certification Manual
4.1 Verification of Internal Plant Movement and Monitoring Have records of plant movement and monitoring been maintained?		The following records shall be maintained: • Origin of plant material • Location on nursery site (block or zone designation) • Regular monitoring records for *P. ramorum* symptoms
4.2 Incoming Plants Are **all** plant purchases documented?		Purchase documents must include: • Plant name and description • Supplier source and location • *P. ramorum* Certification status • Date of receiving • Phytosanitary Certificate for imported plants • Visual inspection for symptoms of *P. ramorum* (date, inspector's name, results)
4.2 Incoming Plants Have isolation and sampling/testing records been taken for host plants (to	.	In addition to the above documentation, add: • Isolation block location (An Isolation Block map must be maintained, See Section 5.2)

be grown on in production areas) purchased from non- *P. ramorum* - certified nurseries in high risk areas?		• Record of sampling and testing for each host plant group held in isolation (employee name and date samples are taken) • Record of testing results
4.3 Plants Received for Immediate Resale Are plants, designated for immediate re-sale, from a nursery certified under *P. ramorum* Certified programs recognized by CNCI or CFIA?		**Yes**, from a *P. ramorum* Certified nursery: Records must be kept as described in Section 4.2. Invoice states that plants are "*P. ramorum* Certified" **No**, from a non-certified nursery: Records must be kept as described in Section 4.2 Invoice clearly states plants are **not** *P. ramorum* Certified
4.4 Outgoing Plants Are records kept for all plants that are shipped from the nursery? Have all outgoing plants been inspected for signs of *P. ramorum*?		Records must include: • Plant name and description • Last growing location on nursery • Destination of plants • Date of shipment • Copy of Phytosanitary certificate if export • Visual inspection for symptoms of *P. ramorum* • Name of inspector, date of inspection (Inspectors must be trained as outlined in Section 9.0)
4.5 Spray Records Have all fungicide applications records?		• Records of fungicide applications • Note that federal or provincial government requirements for pesticide application and record keeping must be followed.
4.6 Soil-less Media, Organic Mulches and/or Soil Are delivery records kept for every shipment of soil-less media, ingredients used to make soil-less media, organic mulches, and soil?		Keep records for all growing media or media ingredients received at the nursery facility (delivery memos or invoices)
4.7 Records of Visitors **Optional:** Is there a record of every visitor to the nursery?		Highly recommended that a visitor's log be maintained. (Not mandatory)

5.0 Preventing the Introduction of *P. ramorum*		
5.1 Plants from *P. ramorum*-certified Nurseries Are plants from sources that are *P. ramorum* Certified or are in areas considered to be low risk for *P. ramorum*?		Supplier sources from one or more of the following: • Participation in a *P. ramorum* Certification program approved by CNCI or CFIA • *P. ramorum* free areas accompanied by a phytosanitary certificate • Domestic regions deemed by CNCI to be of low risk
5.2 Plants from non-*P. ramorum*-Certified Nurseries **5.2.1 Host Plants** Are host plants purchased from a non-*P. ramorum* -certified nursery that is located in a production area known to be high risk for *P ramorum*?		• Incoming host plants must be placed in isolation (location noted on nursery site map) • Blocks are separated by 2 meter, plant and weed-free buffer zones or plants are placed in separated, sealed poly houses (2 meter buffer at entrance) • An exception to this are sealed poly houses where there is a 2 meter distance from any opening to the nearest plants, although there may be no buffer between plants inside the poly house to those outside the poly house. For poly houses with roll-up sides, or with cut sides, the two meter buffer (canopy to canopy) applies. • All plants are sampled for evidence of *P. ramorum* (See Appendix V) • Strict biosecurity protocol must be in effect, see Appendix VII • Plants can be moved into the production area or sold when negative *P. ramorum* sampling results have been received
5.2.2 Non-Host Plants Are there symptoms of *P. ramorum* found on non-host plants?		**No** – move to production area **Yes** – move to isolation area, sample and test as with host plants
5.3 Plants from Canadian Wildland Sources (where *P. ramorum* is not known to exist) Is the source of plant material from a natural setting?		• Scion, seed or plant material should not be obtained from areas where plants have been introduced by people • Progeny trials, plant banks, and seed orchards are exempt • Visually inspect for *P. ramorum* symptoms prior to harvest and continue monitoring

5.4 Inspection of Incoming Plants Are **all** incoming plants inspected?		• All plants must be inspected visually for symptoms of *P. ramorum* • Inspectors must meet the training requirements outlined in Section 9.0 • Any plants with visual symptoms must be either placed in isolation or disposed of off site in a manner outlined in the Nursery Certification Manual – refer to Appendix V for information. • See Section 4.2 for documentation requirements, including record of inspection
5.5 Plant Returns Are plants returned to your nursery?		• Non-host plants can be returned directly to the production area • Low risk host plants should either not be returned or placed in a segregated area; if symptoms appear then sample, and test prior to returning to production area • High risk plants must **not** be returned to the nursery
5.6 Monitoring of Plants Are all production plants regularly visually inspected for signs of *P. ramorum*?		• Monitoring program for visual symptoms of *P. ramorum* infection • Your manual should define the appropriate number and timing of visual inspections required, based on the season and climatic conditions. • Maintain inspection records • Symptomatic plants are isolated, sampled and tested , see Section 5.2 or disposed of in a manner outlined in the Nursery Certification Manual
5.7 Plants Received for Immediate Resale Are all host plants designated for immediate re-sale held in the shipping area?		• All host plants for immediate resale must have originated from a recognized *P. ramorum* certification program or have come from a *P. ramorum*-free area of production in order to remain Certified • Plants from a non-certified nursery cannot be sold as *P. ramorum* Certified
5.8 Nursery Production Practices (BMP's) **5.8.1 All Host Plants** Are the mandatory Best Management		Highly recommended practices include: • Minimize standing water • Control leaf litter and plant debris • Manage movement of staff, equipment and plants

Plans (BMP's) in place to minimize risk of *P. ramorum* infection and spread?		• Implement a IPM program to minimize spore transfer • Destroy plants with suspicious positives and all plant material within a 2 meter radius of the suspect plants
5.8.2 High Risk Host Plants High risk genera are: Rhododendron, Camellia, and Viburnum Does your nursery produce these plants?		**Mandatory BMP's for high risk plants:** • Segregate with 2 meter buffers (can use non-host plants in buffer) • Sample and test symptomatic plants • Set up a IPM program to control possible spore spread • Remove plant debris from container bed on a regular schedule as outlined in the Nursery Certification Manual **Highly recommended BMP's** • Minimize foliage wetness • Control weeds • Minimize standing water or puddling • Minimize plant movement in the nursery • Segregate in over-wintering houses • Dispose of high risk host 'cull' plants off-site.

5.9 Biosecurity Is there a biosecurity protocol in place that includes all mandatory biosecurity requirements on your nursery?		**Mandatory biosecurity practices:** • Implement a Visitor's policy that should consider entry restriction into production areas for some visitors • Implement a Sanitation policy to minimize the spread of spores through the nursery • Collect and dispose of plant debris off site **Highly recommended biosecurity practices:** • Maintain visitor's log • Organize staff to work on high risk plants at the end of the day • Manage movement of staff to minimize spore transmission

6.0 Audit		
6.1 Internal Self-Audit of the *P. ramorum*-certified Nursery Has the Administrative Manager appointed an internal auditor? Using this checklist as a guide, have detailed internal audit reports been compiled twice per year?		• Name of the internal auditor • Copy of the *P. ramorum* Certification Standard checklist • Two completed internal self-audit reports produced per year • List of corrective measures required to ensure compliance with the *P. ramorum* Certification Standard
6.2 External Audits Has a Nursery Certification Manual been submitted to CNCI (within 6 months of application)? Has there been a third-party audit conducted (within 12 months of approval of the Nursery Certification Manual and annually thereafter)?		• Submission of your Nursery Certification Manual • Detailed systems audit to ensure implementation prepared by a external auditor, who has been designated by the CNCI • Annual audit after initial 12 month period
7.0 *P. ramorum* Detection		
Has evidence of *P. ramorum* been found on your nursery?		• All suspicious positive results found by CNCI testing will be confirmed by a CFIA laboratory • Report to the CNCI or designate (BCLNA within BC) within 24 hours of the confirmation of a positive test result by CFIA
8.0 Non-conformance		
Have either evidence of *P. ramorum* or violations of the *P. ramorum* Certification Compliance Agreement been found at your nursery facility? (See Standard for major non-conformances)		• Your nursery facility will be suspended from the program and removed from the list of *P. ramorum* -certified nurseries. • Shipping as a *P. ramorum* Certified Nursery must be suspended immediately. • Corrective measures must commence. • Compliance must be verified by a CNCI approved external auditor or the CFIA before re-instatement to the program.
9.0 Training and Education		
Have the Administrative Manager and the Implementation Manager attended		• Administrative Manager and the Implementation Manager attend CNCI approved P. ramorum

a CNCI approved *P. ramorum* Certification Program workshop? Have the sampling and inspection personnel and the internal self-auditor either attended a CNCI approved *P. ramorum* Certification Program workshop or been trained by authorized personnel who have complete a *P. ramorum* 'Train the Trainer' program?		Certification Program workshop and pass the P. ramorum Certification program examination • Attend P. ramorum Train the Trainer workshop and train sampling and inspection personnel and the internal self-auditor in house • Maintain records of in-house training.